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Empirical Relationship of Exchange Rate with Inflation, International Trade and Gross Domestic Product (GDP) in Pakistan's Economy

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ABSTRACT

In the modern world, the exchange rate plays an important role in measuring the strength of the country's economy in global economic conditions. An exchange rate is an important tool for controlling various macro-economic variables, and it is itself affected by different macro-economic variables. Pakistan is a developing country of the world and its unstable economy faces high variability in the exchange rate or devaluation of the domestic currency. Therefore, this study investigates the relationship of an exchange rate with selected macro-economic variables (i.e. import, GDP, Inflation & export), with a special focus on Pakistan's economy. It also aims at finding out the degree of strength at which selected independent variables to leave a significant impact on the exchange rate in the economy of Pakistan (i.e. from 1992 to 2017). For this secondary database study, data extracted from the official website of World Bank, State Bank of Pakistan and Economic Surveys of Pakistan. Multiple regression models were used to measure the empirical impact of selected independent variables on the exchange rate. Findings show that the Import and Gross Domestic Product (GDP) have a significant negative impact on exchange rate whereas, export and inflation have a significant positive impact on the exchange rate in the economy of Pakistan. The study recommends that the Government of Pakistan should adapt to make its exchange rate policy more effective through high production, more export with a reduction of import and price stability.

Keywords: Exchange Rate, Inflation, Trade, Gross Domestic Product (GDP), Economy.

1. INTRODUCTION

The currency exchange rate has great influence (i.e. positive or negative) on an economy; it is also used to determine the country's economic strength. Generally, over time the exchange rate may be the cause of the trade deficit or maybe the increasing surplus. (Tarek, A. & Rui, C. 2019) & (Lukas, K., & Ian, M., 2019). For that reason,

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analysis of exchange rates is most frequently observed and analyzed in every free economy of the world. Exchange rates are influenced by various macro-economic variables whereas, exchange rates itself affected by different macroeconomics variables such as inflation, trade and GDP growth (Kichun, K., 2019) & (Ngoc-Sang, P., et al., 2019), (Wu, Y., 1996). Pakistan is a developing country of the world and its weak and unstable economy has been affected by exchange rate movements during past decades. Therefore, this study focuses on analyzing movement in the exchange rate during past decades with reference to Pakistan and measuring some of the major forces behind exchange rate movements in the economy of Pakistan. This research paper is split up into three different partitions. Part one explicates introduction, part two briefly gives Literature review, and elaboration of methodology, and part three ends with results, conclusions, and suggestions.

2. LITERATURE REVIEW

Exchange rate in a country is used to measure the rate of change of currencies or an exchange rate is the value of one nation's currency versus the currency of another nation. (Matteo, M., et al., 2019). Exchange rate refers to the Price for which the currency of a country can be exchanged for another country's currency (Lincoln, W.F., McCallum, A.H. & Siemer, M., 2019). There are various macro-economic variables that positively or negatively impact on the exchange rate in a country such as inflation rate, GDP growth, trade and so on (Qiang, L. et al., 2019), (Zhang, 2019) & (Francesco, C. et al., 2019). Whereas in an open economy, the exchange rate is also influenced by various other macro variables (Aftab, & Aurangzeb, 2002). Stability in exchange rate indicates the strength in the economy of the country whereas instability in the currency exchange rate is a sign of the unstable economy of the country. According to Zahoor, & Muhammad, (2009), "Exchange rate instability shows that exchange rate is settled on demand and supply of one nation's currency; it may turn out the fastest moving price of currency and bring all the foreign capital in the economy". According to (Linda, M. Sc., Harald, U., 2019), variability in the currency exchange rate may give competitive trade benefits to the country in the international market. "Depreciation of exchange rate will

affect exports, reserve, and manufacturing productions negatively and imports positively” (Zahoor, & Muhammad, 2009). Hanno, L., Adrien, V., (2019) applied autoregressive distributed lag (ARDL) bounds testing approach and found that the depreciation of domestic currency negatively affects the amount of exported goods in the short run, but positively in long run. Devaluation of domestic currency in a country makes domestic goods cheaper in the international market; this will result in high demand for local goods in the international market and inflow of foreign exchange in the state & (Zhang, 2000). Whereas, the amount of import becomes more expensive. Consequently, the volume of imports in the domestic country will decrease and the outflow of foreign exchange will be controlled (Andrew, A., 2019) & (Dr. Fayyaz A., Dr. Muhammad U., 2019) & (Su-Chang, Y., 2019). Sergi, B. & Martí, M., (2019) & Abeysinghe, & Yeok, (1998) in their research studies found that depreciation in home currency leads to an increase in output which in turn leads to satisfying the demand of goods at local and international level. Thus, a lower value of domestic currency attracts investors to invest in the production of exported goods and to earn a high profit this leads to decisive and positive change in Gross Domestic Product (GDP). An increase in demand for exported goods leads to the high price of domestic goods in the international market; on the other hand, imported goods become more expensive for domestic consumers (Nagayasu, 1998). Inflation is also a very important economic indicator that has great potential to negatively or positively affect the exchange rate in a country. (Thomas, D. et al., 2019), (Armin, F., et al., 2019) & (Taylor, M. P., 1988) found that inflation is a very powerful macro-economic factor that can appreciate or depreciate the exchange of home currency. Whereas, the exchange rate also has the ability to influence inflation in any economy. Olivier, C., et al., (2019) in their research study empirical results confirmed the existence of a long run relationship between inflation and exchange rate. According to Aizenman (1994), constantly lower inflation in any economy is the sign of intensifying the value and purchasing power of domestic currency. Pakistan is a less developed country in the world; however, its weak and unstable economy demands a highly favorable exchange rate. The present exchange rate of Pakistani rupee versus the dollar in figure 1, shows that the economy of Pakistan is highly affected by its instability in the exchange rate or

devaluation of its currency (i.e. Pakistani rupee) during last decades. According to Mustafa & Nishat (2006), macro-economic variables have a significant impact on the exchange rate; this leads to disequilibrium in the economy of Pakistan (Zahoor., et al., 2009).

Figure-1: Exchange Rate of Pakistani Rupee versus Dollars n=25

***Source:** State Bank of Pakistan 2010 and World Bank Official Website, 2018

Therefore, it is stated that fluctuation in the exchange rate has a positive or negative relationship on various macroeconomics variables and plays a very crucial role in any economy of the country. Moreover, this study focuses on examining the empirical impact of selected independent variables (i.e. import, GDP, Inflation & export) on the exchange rate in the context of Pakistan's economy.

3. RESEARCH METHODOLOGY

This study focuses on examining the impact of selected macroeconomics variables (i.e. inflation, the money value of export, the money value of import and GDP) on the exchange rate in the economy of Pakistan. This study is secondary data-based, and annual time series data were collected from the various issues of Economic Surveys of Pakistan and World Bank official website from the period 1992 to 2017. To measure the empirical impact of selected independent variables on dependent variables, the Ordinary

Least Square (OLS) method was applied and the multiple regression model was used. Statistical Package for Social Sciences (SPSS) and MS-Excel were used to analyze the data and present the findings. The findings of this study will provide numerical facts about the significant impact of selected macro-economic variables (i.e. import, GDP, Inflation & export) on the stability of Pakistani currency, which will help to generate compatible initiatives to overcome the problem of currency instability and to improve the economic stability in the country.

3.1. Multiple Regressions

Multiple regressions are statistical techniques that are used to determine the influence of various independent variables on the dependent variable (Pesaran, H. M., Shin, Y., & Smith, R. J., 2001).

Figure: 2- Theoretical Framework of Dependent and Independent Variables in Multiple Regression Model

In this study, multiple regression technique was used to identify the factors that determine the movements in exchange rate with special focus on Pakistan. Figure 2 presents the theoretical framework of dependent and independent variables in the multiple regression model.

3.2. Multiple Regression Equation:

$$y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4$$

Where:

y = Dependent Variable (i.e. Exchange rate)
 b_0 = Intercept/Constant
 b_1, b_2, b_3 & b_4 = Coefficients
 x_1 = Gross Domestic Product (GDP)
 x_2 = Import
 x_3 = Inflation
 x_4 = Export

4. RESULTS AND DISCUSSION

Table 1 presents the Augmented Dicky Fuller (ADF) unit root test. The analysis outcome shows that all variables become stationary at level. According to Pesaran, H. M., Shin, Y., & Smith, R. J., (2001), multiple regression can be applied if all variables become stationary at the level that is $I(0)$.

Table-2: Results of Augmented Dicky Fuller (ADF) Test		
Variables	At Level	Inference
Exchange Rate	-3.270725** (0.0313)	$I(0)$
GDP	-3.877074** (0.0091)	$I(0)$
Import	-3.335320 (0.0119)	$I(0)$
Export	-3.326762 (0.005972)	$I(0)$

*() are probabilities & * shows < 5% probability

Table 2 presents the value of the correlation of the exchange rate with the volume of import and Gross Domestic Product (GDP) in the economy of Pakistan. The value of the correlation of exchange rate with Import (i.e. -0.79) confirmed that there is a negative and statistically powerful relationship between import and exchange rate. The negative sign of correlation indicates that a high value of dollars leads to a decrease in imports during the last two decades in the economy of Pakistan. In table 1, the value of the correlation of the exchange rate with the volume of GDP (i.e. -0.76) shows a negative and impactful association between Gross Domestic Product (GDP) and the exchange rate in the economy of Pakistan. To produce goods inefficient way, often heavy machinery and advance technology are required; whereas Pakistan is a less developed country in that regard in the world. It only produces primary goods, and for capital goods, it extensively

depends on the international market. Therefore, it is stated that growth in Gross Domestic Product (GDP) in Pakistan highly depends on imported machinery and advance technology. Therefore, the exchange rate has a negative impact on imports and Gross Domestic Product (GDP) in the economy of Pakistan.

Table 2: Values of Correlation n=25 years (1992 to 2017)

Independent Variables	Values of Correlation
The monetary value of Import	-0.79
Goss Domestic Product (GDP)	-0.76

*Data Source: World Bank, 2018 & Government of Pakistan 2001, 2006, 2012, 2014 & 18

*Dependent Variable = Exchange Rate

Figure 3 (a) presents the trend of regression whereas, the pattern of regression line shows a direct association between inflation and the exchange rate of Pakistani currency.

Figure-3: Regression Line for Inflation wit Exchange Rate and Import with

*Exchange Rate n=25 Years (1992 to 2017)

*Data Source: World Bank 2018 & Government of Pakistan 2001, 2006, 2012, 2014 & 18

The value of the correlation of exchange rate with inflation (i.e. 0.65) confirmed that there is a positive and significant connection between inflation and the exchange rate in the economy of Pakistan. The devaluation of Pakistani currency makes imported goods expensive (i.e. both consumer goods and capital goods), this leads to high prices of

imported goods and high production cost of domestic goods. As a result, the inflation rate becomes high in the economy of Pakistan. Furthermore, figure 3 (b) pattern of regression line shows a direct relationship between the monetary value of export and exchange rate of Pakistani currency versus dollar. The value of the correlation of exchange rate with the volume of export (i.e. 0.62) proves that there is a positive and statistically high connection between export and exchange rate of Pakistani currency. This indicates that the high rate of exchange or devaluation of Pakistani currency makes domestic goods cheaper in the international market and this leads to an increase in the export of domestic goods.

Table 3 presents a summary of the empirical results for the regression model. The value of R square (i.e. 0.97) indicates that 97 percent variations in the exchange rate in Pakistani currency during the last two decades are explained by this multiple regression model. The value of F-statistics (i.e. 139.6) indicates that the equation as a whole is statistically significant in explaining the relationship between a dependent (i.e. exchange rate) with independent variables (i.e. inflation, GDP, export and import).

Table-3: Summary of Empirical Results for Multiple Regression Model				
Model	R	R Square	Adjusted R Square	F-Statistics
1	.986a	.972	.965	139.591*

*Data Source: World Bank 2018 & Government of Pakistan 2001, 2006, 2012, 2014 & 18
Significant > 0.000

Table 4 shows that the values of t-statistics for all four independent variables (i.e. inflation, GDP, export and import) are statistically significant. However, negative signs of t-statistics indicate that Gross Domestic Product (GDP) and imports have an inverse relationship with the exchange rate of Pakistani currency versus dollar. Whereas, positive signs of t-statistics indicate that inflation and export have a direct relationship with the exchange rate of Pakistani currency versus dollar. Comparative analysis of t-statistics indicates that the volume of import is the first more forceful dependent variable in this regression model whereas the volume of Gross Domestic Product (GDP) growth is a cooperatively second more impactful dependent variable in this regression model.

Table-4: Variables in the Equation for Multiple Regression Model

Model		Un-Standardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	6.778	4.376		1.549	.141
	GDP (million)	-3.367E-6	.000	-.369	-4.729	.000
	Import (million)	-2.304E-5	.000	-1.395	-5.168	.000
	Inflation (2005 = 100)	.458	.133	1.078	3.447	.003
	Export (million)	4.921E-5	.000	1.525	3.184	.006

*Data Source: World Bank 2018 & Government of Pakistan 2001, 2006, 2012, 2014 & 18

Furthermore, in table 4, the value of b-coefficient for Gross Domestic Product (i.e. -3.367E-6) shows that the average decrease in the exchange rate of Pakistani currency versus dollars is associated with approximately 3.367 million increases in the volume of GDP. The value of b-coefficient for import (i.e. -2.304E-5) shows an average decline in the exchange rate of Pakistani currency versus the dollar is associated with approximately 2.304 million increases in import. Additionally, the value of the b-coefficient for inflation (i.e. 0.48) shows that the average higher movement in the exchange rate of Pakistani currency is associated with an approximately 0.48 percent raise in the rate of inflation. The value of b-coefficient for export (i.e. 4.921E-5) shows that average enlarge in the exchange rate of Pakistani currency is linked with approximately 4.921 million increases in export.

5. CONCLUSION

This study concludes that the exchange rate is a very important economic variable that leaves significant impacts on any economy including Pakistan as well. During the last decade, Pakistan is highly affected by the fast increasing trend of the exchange rate resulting in economic instability in this country. Therefore, this study analyzed the impact of inflation, Gross Domestic Product (GDP), export and import on the exchange rate in the context of Pakistan. Finding of the research (i.e. values of correlation, t-statistics, and b-coefficient) confirmed that import and Gross Domestic

Product (GDP) have negatives; whereas inflation and export have a positive impact on the exchange rate. However, among selected independent variables, import and Gross Domestic Product (GDP) are categorized as the most impactful independent variables in determining the exchange rate in Pakistan. Based on this study's results, it is to be recommended that the Government of Pakistan should adapt to make exchange-rate policy more effective so that it upgrades the value of Pakistani rupee. Policymakers should try to make trade policy more effective as to boost up the export and to control the import in Pakistan. To control inflation and to get benefits from international trade, anti-inflationary policies should be adopted. The government of Pakistan should try to make its price policy more effective and to enlarge the volume of Gross Domestic Product (GDP). In the production sector, advanced technology and less dependence on the international market for capital goods is required. Therefore, it is recommended through this study that the enterprises should have to adopt a more effective long-term strategy to promote international trade. It is suggested that at the policy level the Government of Pakistan should try to take special initiatives to increase the public and private investment in the production sector.

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